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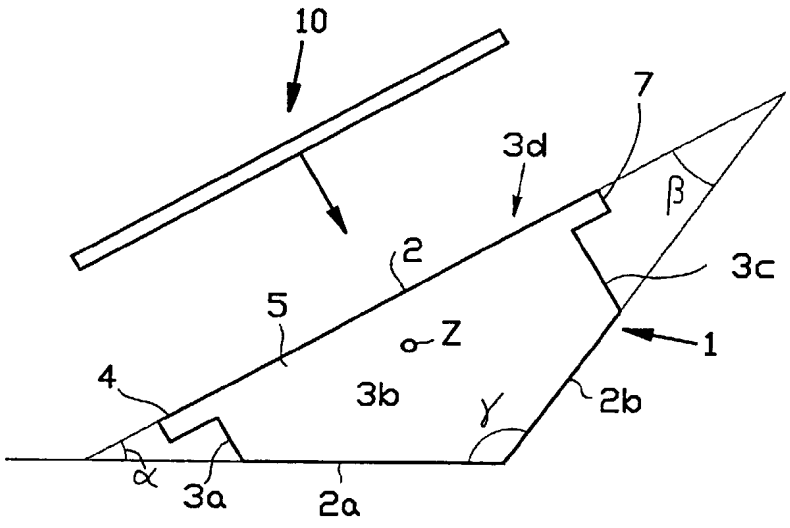
[Continued on next page]

(54) Title: CARRIER FOR A SOLAR PANEL



(57) Abstract: Tray-shaped synthetic carrier (1) for a solar panel (10), comprising first supporting means (2a, 2b) for supporting the carrier (1) on a flat roof and second supporting means (4) for supporting the solar panel (10) in a panel supporting face that is at an angle to the first supporting means (2a, 2b), the first supporting means (2a, 2b) comprising at least one first carrier supporting face (2a) and one second carrier supporting face (2b), which are at a first and a different second angle, respectively, to the panel supporting face.

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CARRIER FOR SOLAR PANEL

The invention relates to a carrier for a solar panel on a flat roof, as well as an assembly of a solar panel and such a carrier. The invention furthermore relates to a group of such assemblies, positioned on a flat roof.

It is known to place solar panels, particularly PV panels, on a flat roof, such as the roof of a business building. An example of a carrier including solar panel for a flat roof is shown in Dutch patent application 1005204. Here the carrier is formed by a tray made of synthetic material, having a flat bottom and a circumferential wall comprising two almost upright side walls, an inclined high end wall and an inclined low end wall, and at the top is provided with a circumferential flange. Said flange forms an inclined supporting face for the panel at 25° to the bottom. Said fixed angle value is adjusted to the Netherlands in order to be able to place the solar panels in series one behind the other without shadow. Thus with a placement density that is as high as possible the largest efficiency possible is obtained.

A drawback of this is that an optimal efficiency cannot be obtained in case of solitary placement of the carrier/solar panel-assemblies. A lower efficiency will have to be settled for, or another embodiment, having another angle will have to be made available.

It is an object of the invention to improve on this.

A further object of the invention is to provide a universal carrier for a solar panel for one or more certain degrees of latitude, with which both in a group arrangement and in a solitary arrangement an optimal efficiency can be obtained.

From one aspect the invention to that end provides a carrier for a solar panel, formed like a tray, particularly as a unit of synthetic material, comprising first supporting means for supporting the tray-shaped carrier on a flat roof and second supporting means for supporting the solar panel in a panel supporting face that is at an angle to the first supporting means, the first supporting means comprising at least one first carrier supporting face and one second carrier supporting face, which are at a first and a different second angle, respectively, to the panel supporting face, the second supporting means comprising a supporting flange extending outwardly from the tray to at least the level of the first carrier supporting face and at least the level of the second supporting face, considered in an upward direction away from and perpendicular to the carrier supporting faces in question.

In this way a carrier is provided that is able to support a solar panel in two orientations without additional operations being necessary to that end. The carrier simply has to be placed on the roof with the supporting face corresponding to the desired placement angle. The tray-shaped carrier can stay limited in size here, compared to the circumferential size of the solar panel. When no ballasting has to take place it may furthermore be possible to pre-mount the solar panels on the carrier, as at the location of the arrangement the carrier including solar panel can simply be put on the selected supporting face.

Preferably the flange in said direction is spaced apart from both the first and the second carrier supporting face, as a result of which in case of the carrier sagging in the roof (for instance gravel) the solar panel remains free and the solar panel is not polluted by splash water.

Preferably the tray-shaped carrier has end walls between the flange and the first and the second carrier supporting faces, which end walls are preferably at least almost perpendicular to the flange.

Preferably the first carrier supporting face and the second carrier supporting face are adjacent to each other, so that the carrier after having been placed on the roof can easily be tilted into the correct orientation.

Preferably the first carrier supporting face and the second carrier supporting face include an angle being 180° minus the sum of the first and the second angle. In this way the stability of the carrier in both orientations is improved. The supporting face not used will then rise rearwards from the actual supporting surface and form a kind of rear wall.

Preferably the first angle is 25°, and the second angle 36°, in which way an optimal angle is offered both for a close group arrangement and for the solitary placement in the Netherlands.

Preferably the first and second carrier supporting faces form a wall or plate, which may be provided with profilings for stiffening, for ventilation and/or water discharge. The wall or plate may form a ballast support here.

Preferably the panel supporting face is situated entirely on the side of the first and second carrier supporting faces facing away from the roof surface, so that the transfer of the carrier from the one position to the other may take place unimpededly.

Preferably the carrier forms a tray-shaped body, in which the panel supporting face is formed by a turned edge, such as a flange, of the tray.

From another aspect the invention provides a tray-shaped carrier for a solar panel, comprising a supporting or bottom wall for supporting the carrier on a flat roof and a supporting edge for supporting the solar panel in a panel supporting face that is at an angle to the bottom wall, the bottom wall being divided into at least two selective support sections, that are at an angle to each other.

Preferably the support sections extend from a centre area of the bottom wall to the opposite ends of the carrier.

Preferably the panel supporting face comprises a supporting flange extending from the tray to the outside, which flange is situated at least at the level of or spaced apart from the respective supporting faces.

From a further aspect the invention provides a tray-shaped carrier for a single solar panel, comprising a supporting or bottom wall for supporting the carrier on a flat roof and a supporting edge for supporting the solar panel in a panel supporting face that is at an angle to the bottom wall, the bottom wall being divided into at least two supporting faces that are at an angle to each other, the tray-shaped carrier having pentagonal side walls.

From a further aspect the invention provides a tray-shaped carrier for a single solar panel, comprising a supporting or bottom wall for supporting the carrier on a flat roof and a supporting edge for supporting the solar panel in a panel supporting face that is at an angle to the bottom wall, the bottom wall being divided into at least two supporting faces that are at an angle to each other, the spaced apart edges of both the supporting faces being in a plane that is spaced apart from the plane of the panel supporting face and/or intersecting said plane at a location spaced apart from the carrier.

Preferably the carrier according to invention is provided with drainage holes near the carrier supporting faces, for discharge of condensation and precipitation that may have fallen in.

The invention furthermore provides an assembly of a carrier according to the invention and a solar panel.

The invention further provides a group of assemblies according to the invention, the assemblies being positioned close behind each other on a flat roof.

The invention will be elucidated on the basis of an exemplary embodiment shown in the attached drawings, in which:

Figure 1 shows a carrier according to an exemplary embodiment of the invention;

Figure 2 shows a number of carriers of figure 1, having solar panels, placed on a flat roof, in a first arrangement;

Figure 3 shows a number of carriers of figure 1, having solar panels, placed in a second arrangement on a flat roof;

Figure 4 shows a view in perspective of an assembly of carrier with solar panel according to the invention;

Figures 5A and 5B show a further embodiment of a carrier according to the invention, without and with a solar panel, respectively.

The carrier 1 in figure 1 is formed by a tray-shaped body made of synthetic material, formed as a unity, for instance by means of vacuum forming.

The carrier 1 comprises a bottom wall 2, a circumferential wall 3, which together define a cavity 5, as well a turned flange 4 circumferential at the upper edge of the circumferential wall 3. Said flange 4 serves to support a schematically shown solar panel 10, which if necessary can be attached to it with means that are not further shown.

The circumferential wall 3 has two parallel and identical, irregular pentagonal side walls 3b, 3d, a first end wall 3a and a second end wall 3c. The walls 3a and 3c have been dimensioned to ensure that the solar panel with its lower edge remains above the roof surface on gravel roofs as well, but the walls 3a and 3c have not been chosen too high to limit the wind load. The walls 3a and 3c are moreover a little inclined with respect to each other in order to be able to easily loosen the

tray 1 from a mould.

The bottom wall 2 comprises two wall sections 2a, 2b which have a surface that is almost similar, and as large as possible for stability (on which ballast can be placed), and which are at an angle γ to each other. The bottom wall section 2a is at an angle α of 25° to the plane in which the flange 4 is situated. The bottom wall section 2b is at an angle β to the same plane, β in this example being 36°. Said angle of 36° is the optimal angle for a solar panel in the Netherlands in case of solitary placement.

As regards this example 180° - α - β, the angle is γ 119°. The bottom wall panels 2a and 2b, considered in general, are situated largely on either side of this line through the centre of area z of the tray 1, perpendicular to the plane in which also flange 4 is situated.

When on a flat roof 20 a close group arrangement is desired of a number of, for instance fifty, assemblies of carriers 1 and solar panels 10, then in case of a close arrangement the carriers 1 are placed on a bottom wall section 2a, in which the plane in which the flange 4 is situated is at an angle of α, in this example 25°, to the roof surface (see figure 2). On the inner surface of the bottom wall section 2a a ballast weight 6 is then placed. The solar panels 10 facing the sun S, then lie on a stable support formed by the carrier 1.

When a group arrangement is not wanted or cannot be realised, and a solitary placement is opted for, the arrangement according to figure 3 can be used. Here the carrier 1 is placed on the bottom wall section 2b, at the inner surface of which a ballast weight 6 has been placed. The plane in which the circumferential flange 4 is situated now is at an angle β of in this example 36° (the Netherlands) to the roof surface.

As a result of dividing the bottom wall into two sections 2a, 2b, and the position of those sections with respect to the centre of area, a stable placement is possible

in both orientations of the carrier.

Making and offering one carrier that can be used in both arrangements will suffice for a certain degree of latitude.

In both positions the entire supporting flange 4 extends above the supporting face 2a or 2b or the roof surface.

In figure 4, for further clarity, an assembly according to the invention is shown in the position of figure 2, in perspective view. Here it can be seen that the carrier 1 supports on the bottom wall section 2a, so that the solar panel 10 will thus be oriented at an angle of 25° at the sun. It can be seen that the flange 4 at the outer edge is provided with a circumferential upright edge 7, which after placement of the solar panel 10 surrounds said panel in circumferential direction.

The tray made of synthetic material, shown in figure 5A, corresponds largely to the tray of the previous figures. The tray 51 has two supporting wall sections 52a, 52b, end walls 53a, 53b and longitudinal or end walls 53c, 53d with the same dimensions and orientations as the corresponding walls in the tray of the figures 1-4.

The walls 53a-d are channel plate-shaped with elevated sections 57 and lowered sections 58. Between the lowered sections 58 a passage is formed at the lower side by the elevated section 57.

The circumferential flange 57 is also provided with elevated (64, 66) sections and lowered sections (65, 67). When the solar panel 60 (see figure 5B) has been placed on the tray 51, the openings 70 thus remain free.

Furthermore the attachment holes 68 in the flange 57 are shown, for attachment means for securing the solar panel 60, particularly with its circumferential profile 61, to the tray 51.

It is noted that it is possible to distinguish more sections in the bottom wall, in order to be able to realise yet more positions with the same carrier.

Claims

1. Carrier for a solar panel, formed like a tray, particularly as a unit of synthetic material, comprising first supporting means for supporting the tray-shaped carrier on a flat roof and second supporting means for supporting the solar panel in a panel supporting face that is at an angle to the first supporting means, the first supporting means comprising at least one first carrier supporting face and one second carrier supporting face, which are at a first and a different second angle, respectively, to the panel supporting face, the second supporting means comprising a supporting flange extending outwardly from the tray to at least the level of the first carrier supporting face and at least at the level of the second supporting face, considered in an upward direction away from and perpendicular to the carrier supporting faces in question.

2. Carrier according to claim 1, the flange in said direction being spaced apart from both the first and the second carrier supporting face.

3. Carrier according to claim 1 or 2, the tray-shaped carrier having end walls between the flange and the first and the second carrier supporting faces, which end walls are preferably at least almost perpendicular to the flange.

4. Carrier according to claim 1, 2 or 3, the first carrier supporting face and the second carrier supporting face being adjacent to each other.

5. Carrier according to any one of the claims 1-4, the first carrier supporting face and the second carrier supporting face including an angle being 180° minus the sum of the first and the second angle.

6. Carrier according to claim 5, the included angle being approximately 119°.

7. Carrier according to any one of the claims 1-6, the first angle being 25°, and the second angle 36°.

8. Carrier according to any one of the claims 1-7, the first and second carrier supporting faces forming a wall or plate, which may be provided with profilings for stiffening, for ventilation and/or water discharge.

9. Carrier according to claim 8, the wall or plate forming a ballast support.

10. Carrier according to any one of the preceding claims, the panel supporting face being situated entirely on the side of the first and second carrier supporting faces facing away from the roof surface.

11. Carrier according to any one of the preceding claims, the flange being circumferential.

12. Carrier according to any one of the preceding claims, the carrier having a rectangular opening at the location of the first supporting means, the long sides of the rectangle extending parallel to the first and second carrier supporting faces.

13. Tray-shaped carrier for a single solar panel, comprising a supporting or bottom wall for supporting the carrier on a flat roof and a supporting edge for supporting the solar panel in a panel supporting face that is at an angle to the bottom wall, the bottom wall being divided into at least two support sections, that are at an angle to each other.

14. Carrier according to claim 13, the support sections extending from a centre area of the bottom wall to the opposite ends of the carrier.

15. Carrier according to claim 13 or 14, the panel supporting face comprising a

supporting flange extending from the tray to the outside, which flange is situated at least at the level of or spaced apart from the respective supporting faces.

16. Tray-shaped carrier for a single solar panel, comprising a supporting or bottom wall for supporting the carrier on a flat roof and a supporting edge for supporting the solar panel in a panel supporting face that is at an angle to the bottom wall, the bottom wall being divided into at least two supporting faces that are at an angle to each other, the tray-shaped carrier having pentagonal side walls.

17. Tray-shaped carrier for a single solar panel, comprising a supporting or bottom wall for supporting the carrier on a flat roof and a supporting edge for supporting the solar panel in a panel supporting face that is at an angle to the bottom wall, the bottom wall being divided into at least two supporting faces that are at an angle to each other, the spaced apart edges of both the supporting faces being in a plane that is spaced apart from the plane of the panel supporting face and/or intersecting said plane at a location spaced apart from the carrier.

18. Carrier according to any one of the preceding claims, the carrier being provided with drainage holes near the carrier supporting faces.

19. Tray-shaped synthetic carrier for supporting a single solar panel on a flat roof, comprising supporting faces adapted to the solar panel for supporting the solar panel at two different angles to the flat roof.

20. Assembly of a carrier according to any one of the preceding claims and a solar panel.

21. Group of assemblies according to claim 14, the assemblies being positioned close behind each other on a flat roof.

22. Carrier provided with one or more of the characterizing measures described in the attached description and/or shown in the attached drawings.

23. Carrier according to any one of the preceding claims, the flange being circumferential.

24. Assembly provided with one or more of the characterizing measures described in the attached description and/or shown in the attached drawings.

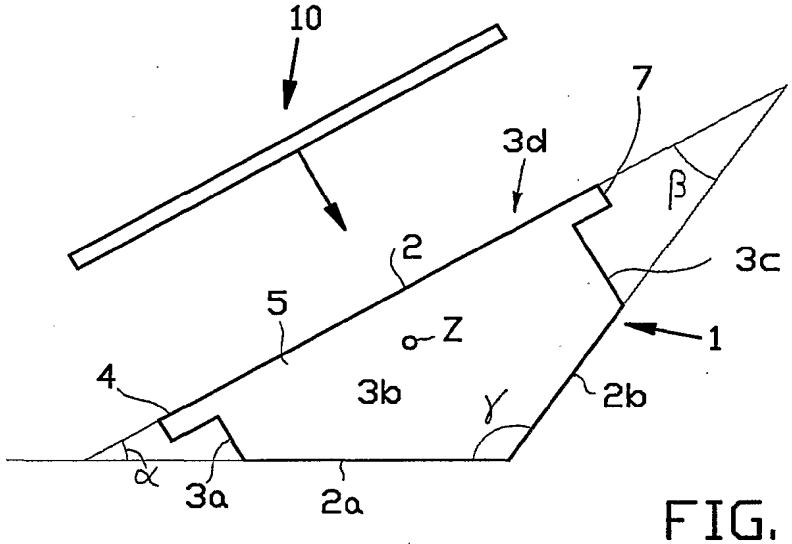

FIG. 1

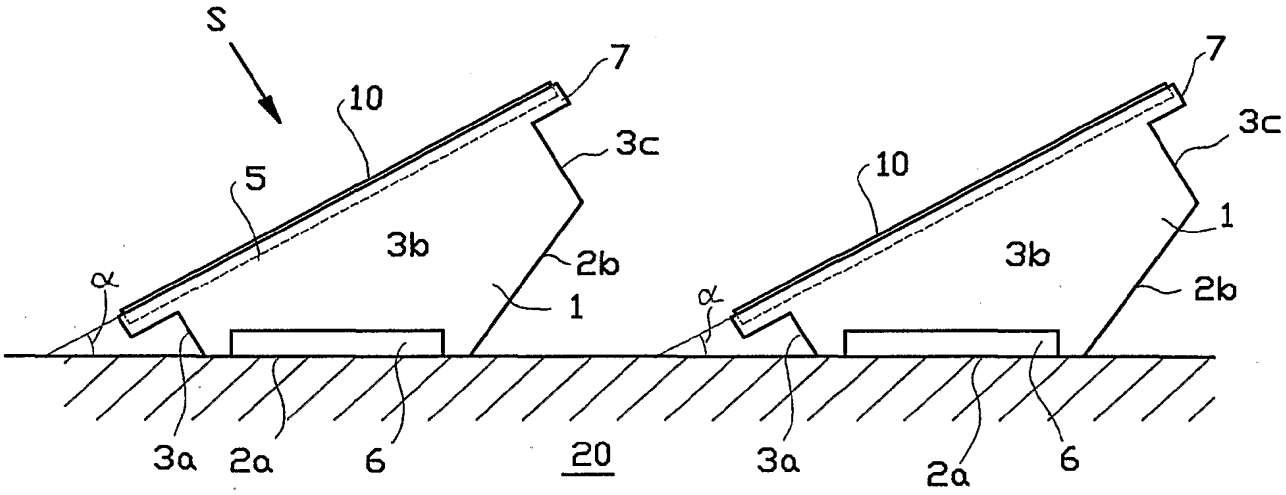

FIG. 2

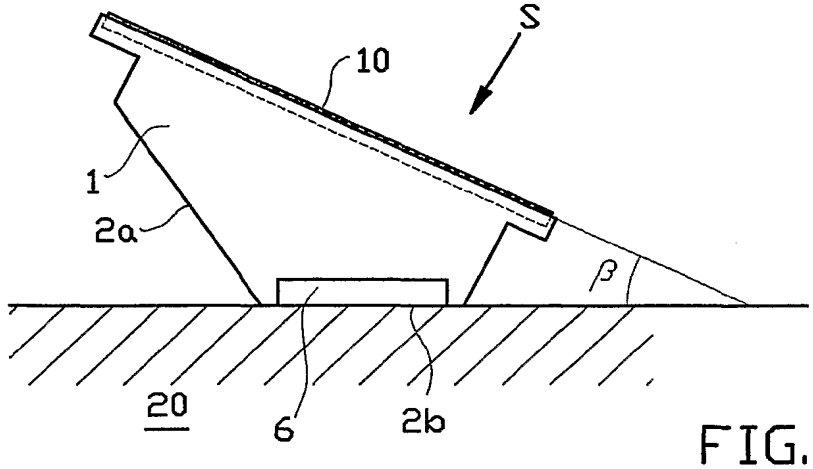

FIG. 3

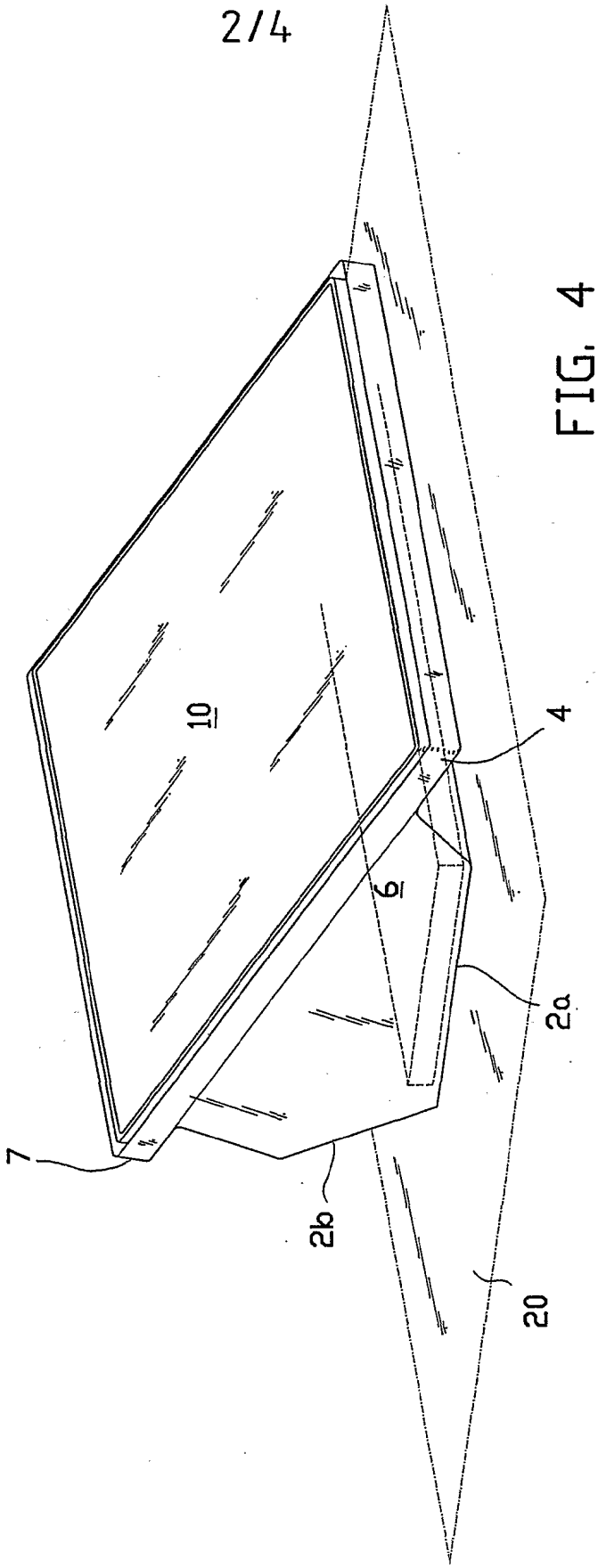

FIG. 4

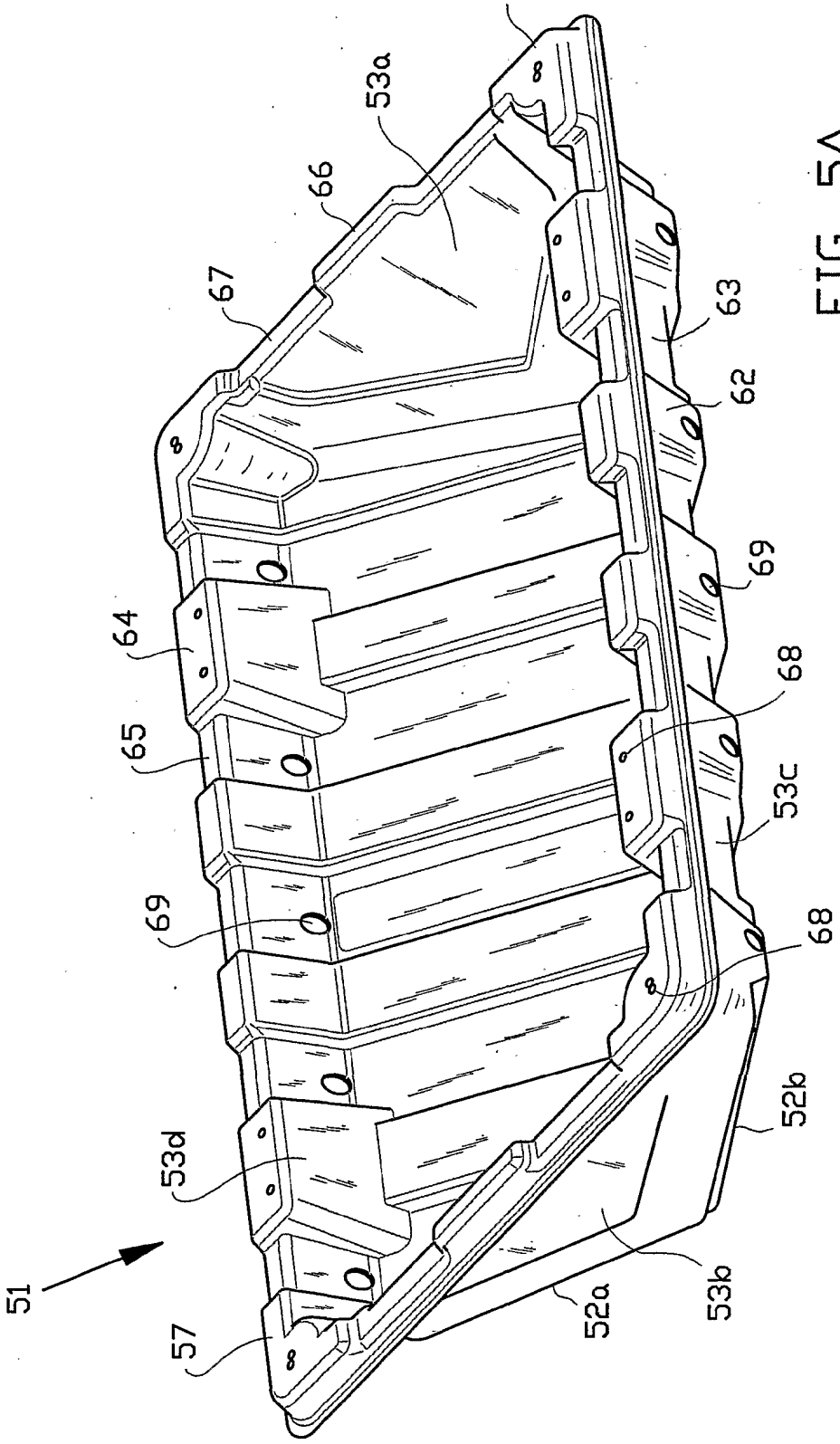

FIG. 5A

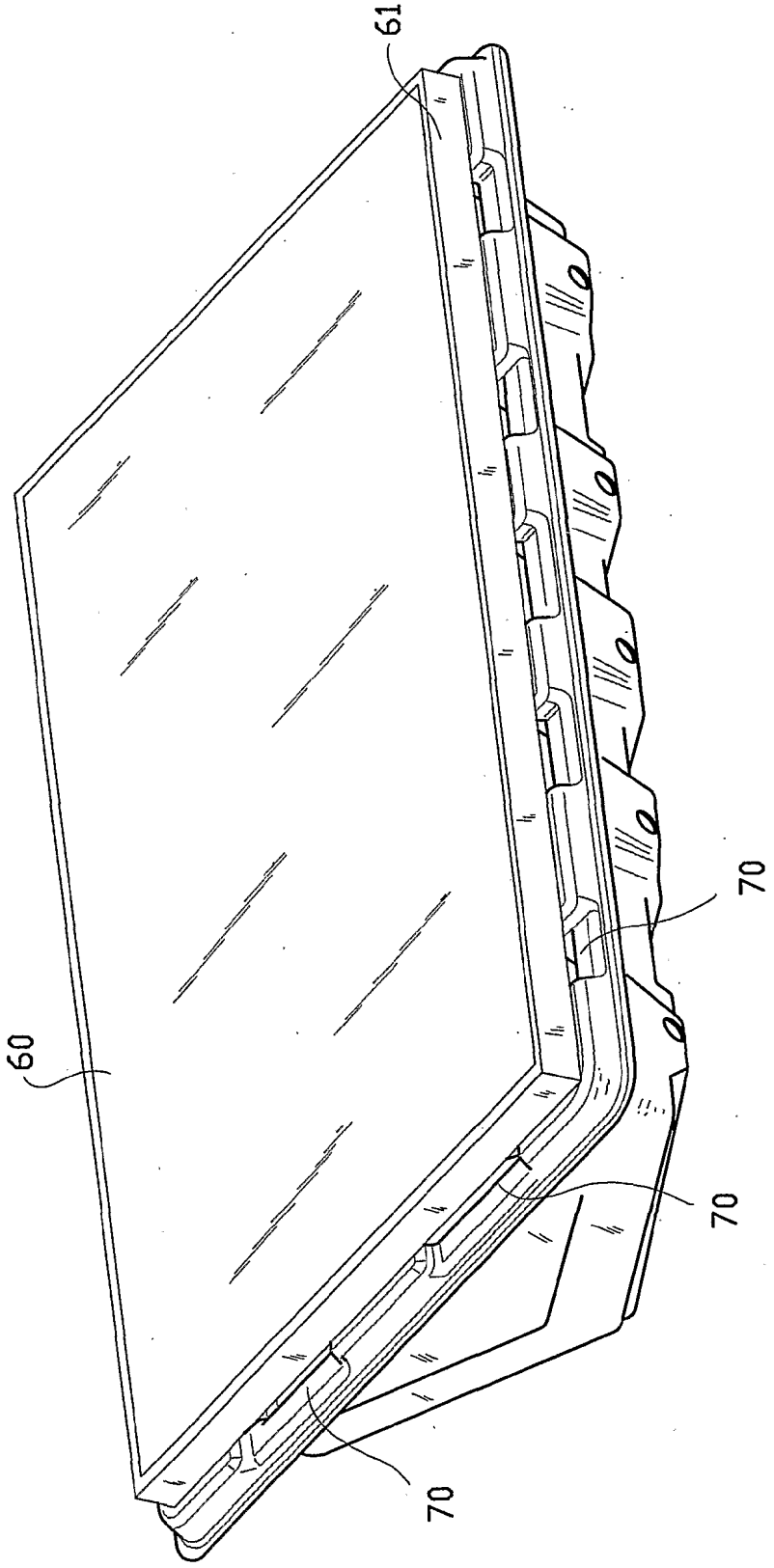

FIG. 5B

INTERNATIONAL SEARCH REPORT

Intern: Application No
PCT/NL 02/00087

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F24J2/52 H01L31/042

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 F24J H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	NL 8 304 155 A (EN BESPARENDE SYSTEMEN B V) 1 July 1985 (1985-07-01) page 3, line 26 -page 5; figures	13,14, 19-22,24 7,16
Y A	NL 1 005 204 C (COOEPERATIEF ADVIES EN ONDERZO) 7 August 1998 (1998-08-07) cited in the application the whole document	1-6,8-24 7
Y	FR 2 305 680 A (BENNAVAIL FRANCIS) 22 October 1976 (1976-10-22) the whole document	1-6,8-24
A	DE 89 14 728 U (LICENTIA PATEN-VERWALTUNGS-GMBH) 11 April 1991 (1991-04-11) page 3, last paragraph -page 6; figures	1,13,16, 17, 19-22,24

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 April 2002	05/06/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Van Dooren, M

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INTERNATIONAL SEARCH REPORT

Inter Application No
PCT/NL 02/00087

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